COPING WITH NEW DIGITAL NETWORKS: UNDERSTANDING EMPLOYEE JOB PERFORMANCE USING SOCIAL NETWORK AND SUPPORT PERPSECTIVES

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ABSTRACT
Information systems (IS) implementations can create technology-enabled disruptive changes in work and information flows, thus creating a new digital network. We examine the role of employees’ peer support network, the social network, in helping employees cope with a new digital network. We draw on research on social networks to conceptualize give-help and get-help ties based on employees’ interpersonal interactions related to the new system and general work practices. An employee’s access to these ties is proposed to have a direct effect on job performance, and the relationships are expected to be moderated by extent of work unit boundary-spanning such that the greater the boundary spanning, the stronger the effect. Job performance is also expected to be positively influenced by ties to the IT function and extra-organizational ties. A social network study of 87 employees at a business unit of a large organization, with data collection before and after an IS implementation, was conducted to test the research model. The results largely support our model, but we also found some unexpected and interesting negative effects of social networks on job performance (e.g., getting system-related help outside the work unit had an adverse effect on supervisor-rated job performance).

INTRODUCTION

New information systems (IS) are one of the most common triggers for organizational change in today’s business world. IS implementations can cause disruptive changes in business processes, jobs, and patterns of flow of information and work (Edmondson et al. 2001). Prior IS research on disruptive innovations (e.g., Lyytinen and Rose 2003) has explained the conditions for and consequences of disruptive technology innovations with a focus on system development activities. Focusing on social networks and social support will further our understanding related to disruptive IT by identifying what it would take to create a favorable impact on employee job performance even within just months of an implementation. Even IS implemented in specific business units can create new and integrated business processes that frequently cut across the boundaries of business units and even organizational boundaries (Robey et al. 2002). The creation of new technology-mediated work and information flows creates a new digital network. Such digital networks connect employees and create greater interdependence via tasks and processes, thus creating challenges for employees. Also, IS can introduce uncertainty and
unpredictability into the work environment (Kolodny et al. 1996) and are likely to hide their internal workings (Weick 1990), thus making failures unpredictable and less comprehensible to employees. The changes in the workflow can also create new rules to organize social relations and perform business transactions, requiring a restructuring of institutional structures and background conditions supporting human work and communication (Ciborra and Lanzara 1994).

Employees can cope with the new digital network by reaching out to others who are competent or resourceful. Informal interpersonal networks are known to play a critical role in the knowledge transfer process in organizations (Cross and Cummings 2004; Reagans and McEvily 2003). This social network may be a source of help in overcoming challenges created by new IS. We suggest that following an IS implementation that creates a new digital network of knowledge and workflow, support from social networks will be critical to employees’ job performance.

New IS are almost always implemented with the goal of improving employees’ job performance. However, there is evidence that IS implementations create disenchantment among employees, are failure-prone, and there are substantial challenges in deriving performance benefits, especially when the changes are extensive (e.g., Chae and Lanzara 2006; Gibson 2003; Robey et al. 2002). It has been recognized that, soon after implementation, there is a significant loss in organizational productivity and performance (e.g., Hitt et al. 2002). Understanding how to help employees cope with this change and achieve job performance improvements in short periods of time is of great importance to create a quick positive return on IS investments.

While there are several streams of research on job performance, little research has aimed at understanding employee job performance in the context of IS implementations. Even the research on job performance as a consequence of IS implementation has not considered the social context in which use is embedded and has provided limited explanation of performance
We draw on past work that suggests that employee performance and even organizational performance are affected by employees’ social networks (e.g., Reagans et al. 2004). Help provided to and by peers in an organization in the context of a new IS implementation can be seen as an instance of interpersonal citizenship behaviors that can enhance employee performance, free up resources, increase coordination, and aid in maintaining a favorable work climate (Podsakoff et al. 2000). Therefore, we propose that an employee’s peer support network (the social network) would help in coping with the new technology-enabled redesigned work processes (the digital network). These informal help networks are proposed as predictors of job performance after the implementation of an IS, when employees deal with changing work processes and learn how to use the system effectively. *We develop a model of job performance, drawing on research on social networks and social support, and empirically test the model in a longitudinal field study.*

The rest of the paper is organized as follows. The next section reviews the social network and social support literature, and presents the hypotheses development. This is followed by a description of the research methodology. Next, we present the findings, followed by a discussion of the implications for theory and practice. The last section presents our conclusions.

**THEORY DEVELOPMENT**

We draw on research on social networks and social support to develop a model linking an employees’ structural position in help networks to their performance after an IS implementation.

**Social Network Perspective**

The social network perspective draws on the patterns of interactions within social units in which an actor is embedded to explain outcomes experienced by the actor. In this perspective, an employee’s position in a social network is linked to performance (Ahuja et al. 2003) and
provides advantages such as organizational assimilation (Sparrowe and Liden 1997) and promotions (Burt 1992), or leads to disadvantages such as organizational exit (Krackhardt and Porter 1986). The structure of social interactions enhances or constrains access to valued resources (Brass 1984; Ibarra 1993). While social networks may also transmit social identity, norms, and social support, they play an important role as a conduit for work-related resources such as task advice and strategic information (Podolny and Baron 1997).

Learning to use new IS entails a knowledge transfer process across users with different skill levels. Informal interpersonal networks play a critical role in the knowledge transfer process in organizations (Reagans and McEvily 2003). An important way that people learn new ideas is by associating those ideas with existing knowledge and they find it more difficult to absorb new ideas outside of their immediate area of expertise. It is easier for knowledge to transfer among people with similar training, background, and job characteristics. This implies that employees in an organizational unit in similar job functions and contexts are more likely to be fruitfully engaged in knowledge sharing that shapes their use of new IS.

Help or advice networks comprise ties through which employees share resources such as information and provide guidance related to work. Our focus is on emergent networks that play a critical role in shaping an employee’s influence and access to resources (Ibarra 1993). These networks involve discretionary patterns of interaction, where the content of relationships may be work-related, social, or a combination (Galaskiewicz 1979). Ties among employees are multiplex, i.e., involving different kinds of resource exchange. We focus on two types of ties—obtaining help (get-help ties) and giving help (give-help ties). While help networks may be formally designed, we focus on the network that emerges through informal interactions.
There is some research linking social networks to job performance. For instance, Brass (1981) found that the centrality of employees’ positions in a network, representing the flow of work, was indirectly related to job performance. Sparrowe et al. (2001) found that employee job performance was positively related to centrality in advice networks. Studies have found that central positions in informal social networks are related to employee influence (e.g., Brass 1984; Brass and Burkhardt 1992) and performance (e.g., Mehra et al. 2001; Sparrowe et al. 2001). Recent work has shown that information-conveying ties and boundary-spanning ties in knowledge-intensive contexts explain employee performance (Cross and Cummings 2004).

Finally, there is an emerging body of literature studying social networks in relation to adaptation to change within organizations. This literature has particularly focused on the role of intra-organizational networks in change implementation effectiveness and IS use (Tenkasi and Chesmore 2003). Often changes are systemic and disruptive for the organization in many ways, entailing changes to several subsystems of the organization such as the social architecture, technical architecture, and/or strategic architecture (Tenkasi et al. 1998), thus making IS implementations an inherently complex process. In this literature, there are two basic views of how network ties may affect organizational outcomes—i.e., a “strong ties” perspective (Granovetter 1982) and a “weak ties” perspective (Burt 1992). Strong network ties imply frequent interaction, an extended history, intimacy and sharing, and reciprocity in exchanges that allow for mutually confiding, trust-based interactions (Tenkasi et al. 1998). In contrast, weak ties are characterized by distant and infrequent relationships that may be casual, less intimacy and sharing, and nonreciprocal in nature. Both strong and weak ties are critical for organizational functioning because they provide access to different kinds of resources (Levin and Cross 2004; Nelson 1989). Ties within work units are more likely to be strong, whereas ties across work units
are more likely to be weak. Overall, while ties *within* work units can provide intimate sharing of knowledge and resources and thus be valuable, ties *across* work units could provide new and non-overlapping insights and thus also be important.

We draw on social network research to examine the structural characteristics of employees in help networks. Given the differences between ties within and across work units, we distinguish between the two and discuss how each will influence employee performance.

**Social Support Literature**

Another pertinent body of research is related to social support in work contexts. Social support is defined as interpersonal transactions that include affect, affirmation, or aid (House 1981). Several models explain the influence of social support on psychological well-being. One such model examines direct and interaction effects with occupational stress as a predictor (cf. Cohen and Wills 1985). The main effect hypothesis was that the effect of support is always positive and therefore, will always have a beneficial effect on psychological well-being. The moderating effect hypothesis was that support positively influenced psychological well-being only in situations of stress. A second model examined the interplay between workplace demands, locus of control, and social support (Karasek and Theorell 1990). Social support has been found to influence an individual’s self-efficacy, which in turn affects the individual’s perceived causal agency in coping with demand situations (Schaubroeck and Fink 1998). Both these streams suggest that social support is more important in times of stressful or demanding work situations that is likely to be typical in IS implementation contexts that create much change.

Past studies have distinguished between emotional and instrumental support, and examined how different types of support affect recipients differently (e.g., Fenlason and Beehr 1994). Studies have also shown different effects for different sources of support—e.g.,
coworkers, supervisors, and friends and family (e.g., Kaufman and Beehr 1986). Also, a few studies have shown the importance of ongoing peer support in work contexts. For example, boundary management between the recipient and provider of support—balancing indifference (i.e., detached, bureaucratic helping) and enmeshment (i.e., biased, overly emotional helping)—is a key concern in ongoing peer support (Bacharach et al. 2000). Some work has linked social support to job performance—e.g., in a study of newcomer adjustment to an organization, Nelson and Quick (1991) found that availability of social support positively influenced job performance.

Drawing on research on social support, we argue that help ties related to technical and general help, both help-giving and help-getting, will influence job performance.

**Hypotheses**

We develop hypotheses based on theoretical underpinnings from social network and social support perspectives. Figure 1 presents our model.

**Figure 1. Research Model**
New IS deployment is likely to create initial challenges for employees as they cope with new work processes, technology features, and user interfaces. The more complex the system and/or the more extensive the changes, the more mentally fatiguing and frustrating it can be (Mumford et al. 1987) and higher the learning requirements (Aiman-Smith and Green 2002). Employees’ job performance can be enhanced by task information available from others—a help or advice network can thus be a means to obtain resources that are instrumental in facilitating individual job performance. Resources accessed through the social network at the workplace could provide help in learning features of new IS, gain new skills needed to use IS, and deal with changing work processes. Familiarity through frequent contact, social pressure from peers, and altruism towards intimates are explanations proposed for the provision of social support (House et al. 1988). A network of strong, interrelated (dense) contacts also means that the providers of support are familiar with the employee’s role requirements and needs (Morrison 2002). Such support is expected to enhance the employee’s competence in using new IS and lead to more effective use, thus enhancing job performance after the implementation. As IS, especially ones that create [new] digital networks, are critical to performing one’s job, if an employee does not have the access to help in using a new IS, he or she is likely to be less effective in discharging responsibilities and be on a steeper learning curve. Therefore, we hypothesize:

\textit{H1a: An employee’s system-related get-help ties will positively influence job performance.}^{1}

Given that an IS implementation can transform work processes, roles, and access to information, it creates challenges for employees. Support from network ties may also help employees cope with the stress associated with changing work processes. An IS implementation may also shift the patterns of information sharing and alter existing bases of power (Burkhardt and Brass 1992). Coping with such change will be facilitated by being able to draw upon others

\footnote{As discussed later, we use in-degree centrality-based measures to capture the level of give or get help ties.}
to get their advice and support. This points to the importance of general help ties above and beyond system-related help ties. Therefore, we hypothesize:

**H1b:** An employee’s general get-help ties will positively influence job performance.

The formal structure of most organizations provides limited opportunities for contact among members of different work groups (Mehra et al. 2006). Work groups in one part of the firm are often unaware of resources and ideas in other work groups. Because information tends to circulate more readily within than across work groups, they develop distinct perspectives and skills. Interactions among employees across groups who possess diverse and different knowledge structures and perspectives will augment the capability for connecting and leveraging different knowledge bases—i.e., innovating—beyond what any one employee can achieve (Cohen and Levinthal 1990, p. 133). However, access to help outside the immediate work unit may have downsides as well. Employees providing help may be less aware of the work domain of the focal employee or may not be attuned to that employee’s task environment. On balance, we propose that the positive aspects of boundary-spanning help ties, in facilitating access to non-overlapping knowledge bases, will offset the negative aspects. Therefore, we hypothesize:

**H1c:** The effect of get-help ties on job performance will be moderated by work unit boundary spanning such that the greater the boundary spanning, the stronger the positive effect.

Cooperative discretionary behavior is important in organizational work contexts (Van Dyne and LePine 1998). Employees can augment organizational effectiveness through behaviors that go beyond task-related activities that constitute their jobs. These activities are considered discretionary because employees are not contractually bound to perform them. Nonetheless, they are implicitly recognized as important for organizational effectiveness and job performance (Borman and Van Scotter 1994). Thus, employees who provide extra-role help to other employees are likely to be recognized for their citizenship behaviors and enhanced contribution.
to organizational effectiveness. Help-giving also signals that providers are experts in their specific domains and their superiors and peers are likely to attend to such signals.

From a resource dependence or exchange theory perspective, power results from both access to and control over important organizational resources, such as information. People who have access to resources decrease their dependence on others, and people who control relevant resources increase others' dependence on them, thereby acquiring expert and/or referent power (Pfeffer 1981, 1982; see also French and Raven 1959). Thus, employees providing information would acquire power over others that can be leveraged in times of need to aid them in their own job. An additional contribution to employees’ job performance due to help-giving may lie in perspective taking. An employee helping others will likely see the problems others are facing and be able to see more of the big picture in the organization, so they would gain valuable insights and learn things that could help in their own work. As with help-getting, help-giving is with reference to system-related and general issues, with the latter, as discussed earlier, being related to general support. Therefore, we hypothesize:

\textit{H2a: An employee’s system-related give-help ties will positively influence job performance.}

\textit{H2b: An employee’s general give-help ties will positively influence job performance.}

Interdepartmental goals are usually at least partially incompatible, thus causing department members to face the dilemma between serving their own department's goals and the overall goal of organizational effectiveness (Nauta et al. 2002). An important proposition of models on conflict and negotiation is that the likelihood of problem solving is increased when employees are concerned not only about the goals of their own department but also about the goals of other departments (e.g., Blake and Mouton 1970; Rubin et al. 1994). Thus, employees providing help outside their department will be seen to be contributing more towards
organizational goals. We also expect that employees who provide help across departmental boundaries will be more likely to have substantial business unit, or even organization-wide, visibility. At the same time, there may be some downside to providing such help as the employee may be seen as wasting time and effort on activities that do not directly benefit his or her own immediate work unit and job. On balance, we hypothesize that employees providing help outside their department will be viewed favorably. Therefore, we hypothesize:

H2c: The effect of give-help ties on job performance will be moderated by work unit boundary spanning such that the greater the boundary spanning, the stronger the positive effect.

Centrality in the advice network reflects an employee’s involvement in exchanging assistance with coworkers and engaging in mutual problem solving (Sparrowe et al. 2001). An employee who is central in the advice network is, over time, able to accumulate knowledge about task-related problems and workable solutions (Baldwin et al. 1997). Such expertise not only enables such an employee to solve problems readily, but also serves as a valuable resource for future exchanges with coworkers. As others become dependent on such a central employee for important advice, he or she gains an advantage that can be used in future exchanges for valued resources (Cook and Emerson 1978). In contrast, those who are in peripheral positions in the advice network will find it much more difficult to develop expertise about task-related problems and solutions and are thus less likely to develop the competencies and expertise necessary for high levels of performance (Sparrowe et al. 2001).

Past research suggests that opinions and behaviors are more homogeneous within groups than between groups, so people connected across groups are more familiar with alternative ways of thinking and behaving that enables them to synthesize knowledge and generate richer insights that span knowledge domains (Burt 2004). Also, people whose networks bridge across groups have earlier access to a broader diversity of information and have experience in transforming
information in a manner that it is accessible to different groups. Brokers function as bridges that enable units to learn from others’ experience, inform and influence others, expand perspectives, provide mutual feedback, and encourage dissemination of new practices and shared meanings (Tenkasi et al. 1998). New IS implementations are particularly characterized by negotiations over actions and meaning where power plays an important role (Jasperson et al. 2002). Hence, we expect employees in brokering positions to benefit from access to information and to be in a position to mediate these information flows. Access and control of system-related and general help will have a favorable effect on employees’ job performance. Therefore, we hypothesize:

*H3a:* An employee’s system-related brokering ties will positively influence job performance.

*H3b:* An employee’s general brokering ties will positively influence job performance.

An employee may reach outside their business unit and even organizational boundaries for help. For IS implementations, employees in the IT function constitute an important source of external expertise. While all employees may have equal access to this expertise, an employee may be more or less connected to IT staff and/or are more or less likely to seek the help of IT staff. Research on coping with new IS has shown that employee adaptation efforts are often quite extensive and involve the IT function: “…I called the help desk many times over the first few weeks after which I discovered new uses mostly by trial and error” (Beaudry and Pinsonneault 2005, p. 509). Employees who actively seek and obtain help from IT staff are likely to use the new system more effectively in discharging their job responsibilities. Therefore, we hypothesize:

*H4a:* An employee’s help-seeking ties to the IT function will positively influence job performance.

Employees in an organization can also reach out to extra-organizational sources for help with challenges on the job. Teigland and Wasko (2003) found a positive relationship between boundary spanning communication and performance, and that performance was adversely
affected by reliance on co-located coworkers as knowledge sources. Recent research has also shown that ties outside the organization positively influence individual performance (Cross and Cummings 2004). We suggest that these findings will extend to new IS implementations such that reaching outside the organization for help would favorably influence employee performance. The rationale is that those outside the organization may be at a more advanced stage on the learning curve, may have substantial relevant experiences, and/or possess very similar expertise on similar systems and/or organizational situations, and when an employee can access such knowledge through his or her ties, there will be a positive impact on the employee’s job performance. Therefore, we hypothesize:

\[ H4b: \text{An employee’s help-seeking ties outside the organization will positively influence job performance.} \]

**Controlling for Pre-implementation Performance**

We are specifically interested in how employees’ structural position in help networks explains employees’ post-implementation job performance in the context of an IS implementation that creates a new digital network. Therefore, we control for pre-implementation job performance. This is expected to capture stable employee competence and personality traits.

**METHOD**

In this section, we describe the context of our study, new IS introduced, participants, measurement details, and data collection procedure.

**Context**

We collected data in a business unit of a large multinational company. The focal system, which we will discuss next, was specifically designed and implemented for the business unit. The business unit managed activities related to suppliers of components and materials for various product lines. The majority of our sample was made up of supplier liaisons whose duties
included selecting suppliers, ordering products, finding new suppliers, sending out calls for bids, receiving and processing bids, and placing orders. Supplier liaisons also interfaced with other business units such as inventory management and accounts payable. The supplier liaisons reported to a product line supervisor. Each product line supervisor supervised about 8 supplier liaisons. Each product line supervisor reported to a product group manager. There were three product group managers, who each supervised between 3 and 4 product line supervisors. The product group managers reported to a vice president. We focus on the product line as the work unit boundary as it creates a natural intra-organizational boundary as employees of a specific product line interact most often with each other and face several collective deadlines.

New Information System

The new system significantly automated and transformed information flows and business processes. Although employees could choose not to use the system or only use it in a perfunctory manner, management pushed publicly for employees to use it. Significant organizational resources were devoted to championing use of the system, training employees, and rolling out process changes. Thus, the system implementation can be seen as organizationally-driven technology-based change. Further, the new software systems, business processes, and information flow created a context to study a digital network and its ramifications.

Management of documents and contacts was a key part of the supplier liaison job function. Historically, the business unit expected each supplier liaison to manage these documents and contacts as they wished, with most employees using off-the-shelf tools. The new system was an integrated solution that allowed employees to manage communication with the suppliers, share information with others in the business unit, and share relevant information with other business units (e.g., inventory management after an order was placed, accounts payable...
The organization’s objective for the new system was to replace the old, independently chosen and fragmented systems with an integrated system that would be easier to support and manage. The new system aimed at organizing and allowing better access to information. The system incorporated sophisticated workflow functionality and helped manage all types of content and documents (e.g., emails, faxes, request for quotes, orders) through well-defined templates. Other relevant organizational systems were integrated with the new system—e.g., systems in inventory control and accounts payable. While the business unit had designed the supplier liaison positions to be autonomous for the most part, each product line and the business unit had collective goals. The new system was designed to assist in managing these shared goals and to streamline business processes through integration with other organizational systems.

The IT department of the organization developed the system in-house over a period of 8 months. Overall, the system comprised a new hardware platform, several software packages, and a supplier-side interface and associated functionality and similarly, an employee interface and associated functionality. Employees could choose to use the system fully, in part (a subset of the functionality available) to supplement their old systems, or not to use it at all.

**Participants**

The participants were employees in the business unit who were the target users for the new system. The sampling frame was 108 knowledge workers (not including the leadership team or secretarial staff) of the business unit. Members of the business unit interacted in the context of the new system that bound them with a shared symbol system and interdependent processes. For this reason, membership in the business unit was deemed an appropriate boundary for this study. As noted earlier, we examined employees boundary spanning across different work units, to the IT function, and across organizations. We interacted extensively with the leadership team, not
only about the objectives of this study, but also as they were the primary stakeholders to whom we provided feedback. They were, therefore, not included in the study. Eighty-seven of the 108 potential employees provided usable responses in all phases of the study. Of those, 22 were women (25.3%), participants’ average age was 38.9 with a standard deviation of 8.8, and average organizational tenure was about 5 years. While we had no control over non-response, a response rate of 80.5%, we found that the demographic profile of non respondents was identical to that of the respondents, thus alleviating the problem of non-response bias to some extent.

Measurement

Social Network Measures

Social network data were collected using widely-accepted sociometric techniques (Wasserman and Faust 1994). Respondents were provided with a fixed contact roster and asked to describe the frequency of contact with every individual on the roster (containing the names of all 108 possible participants). With this approach, information can be gathered on all interactions within a network. Each respondent indicated their frequency of interaction with other employees in terms of giving and getting system-related and general help. The elicitation, similar to past research (Cummings and Cross 2004; Garton et al. 1997), was based on the following question (for general help): In general, which of the following persons at <business unit>, do you contact for help or advice with your work (related to your work tasks and not administrative activities). Please leave the row blank if you do not interact with that person at all. (I contact this person/This person contacts me). The end points for the five-point scale were “Many times a day” and “Less than once a month”.

Distinguishing between help-giving and help-getting ties, and system and general help, we constructed four social networks: new system get-help, new system give-help, general get-
help, and general give-help. A social network comprises a set of individuals and the ties among them, where the ties represent communication or work interaction directed towards seeking or providing help to peers. In a social network, an ego refers to a focal node in the network and the alter refers to a node adjacent to a previously-referenced node (Borgatti and Everett 1993).

Social networks can be represented through affiliation matrices. In our case, the help interactions resulted in four matrices, with each cell associating a respondent i with an alter j:

1. Get-help (system-related) \( ij \) – Assessment of frequency of contacts made to get system-related help from employee j
2. Give-help (system-related) \( ij \) – Assessment of frequency of contacts made by employee j seeking system-related help
3. Get-help (general) \( ij \) – Assessment of frequency of contacts made to get general help from employee j
4. Give-help (general) \( ij \) – Assessment of frequency of contacts made by employee j seeking general help

For each of these matrices, consistent with prior research (e.g., Borgatti et al. 1999), we dichotomized tie-strength—a relationship with frequency of interaction at level 3 or above is treated as a tie being present while level 2 or below indicates the absence of a tie. Compiling all responses from all members of the social network creates a map of the social network wherein an ego is considered tied to an alter if they either give or get help from that individual. Based on this, the structural measures described next were computed for each employee.

**Get-help Ties.** The system-related get-help score for each individual is calculated as the in-degree centrality for ego in the system-related give-help network. In-degree centrality takes into account the direction of a network link, including only those where the focal person is the object of a connection (Freeman 1979). In-degree centrality for an ego in a network is calculated here as the number of ties where alters reported giving help to the ego. For example, if Sally, Michael, and Carl all give system-related help to Sam, this would give Sam a 3 for his system-related get-help score. Similarly, general get-help ties were operationalized by computing in-degree
centrality for the ego in the general give-help network. Using information aggregated across organizational peers (in give-help network) rather than self-report (in get-help network) allowed an assessment that is less sensitive to individual biases in responses.

**Give-help Ties.** This was computed based on in-degree centrality for each ego in the get-help network. For example, if Carl, Jane, and Michael get system-related help from Sally. This would mean that Sally has a score of 3 for system-related give-help. Similarly, the general give-help tie score was operationalized for each ego by computing in-degree centrality based on the general get-help network matrix.

**Brokering Ties.** Brokering is operationalized as the betweenness centrality score for each ego in the system-related and general help networks respectively. This metric has the advantage of assessing the effect of ties beyond direct ones (Cross and Cummings 2004). To construct the help network to assess brokering, an average of ego and alter responses was computed and dichotomized. Betweenness centrality is calculated as the number of times that an ego falls on the shortest path between two others (any other two in the network). The more often an ego falls on the shortest path between two alters in a social network can be considered a potential type of power as the intermediary controls inflow and outflow of knowledge in the case of help networks. In line with past work, the betweenness centrality scores were normalized to a score between zero and one by dividing the centrality score by the maximum centrality score (Burkhardt and Brass 1990).

**Work Unit Boundary Spanning.** This was operationalized as the ties of an ego outside the immediate work unit as a proportion of the total number of ties. The work unit was identified as the product line group to which the employee belonged. For the get-help network, this score is the proportion of get help ties of the ego outside the work unit divided by the total number of
ties. For example, if Sam, John, and Paul reported giving help to Mary, and John belonged to a different product group but the others were in the same product group, then the work unit boundary spanning score (get-help) for Mary would be 1/3 or 0.33. Similarly, work unit boundary spanning (give-help) is calculated as the give-help ties of the ego outside of the work unit as a proportion of the total number of ties.

**Social Support Measures**

**External Help (IT Function).** This was operationalized as the extent to which employees in the IT function were helpful in solving problems with respect to use of the new system (1 = Extremely Unhelpful, 7 = Extremely Helpful, 0 = Not a source of help). As this scale did not relate to every employee in the IT function, we used three items by adapting the helpfulness scale from the social support literature (Louis et al. 1983).

**External Help (Extra-organizational).** This was operationalized as the extent to which people outside the organization were helpful in solving problems related to general work activities, where the focal employee obtained help. The five-item scale was similarly constructed based on helpfulness scale (Louis et al. 1983). One item asked about all the extra-organizational help received with other items focusing on various sub-groups. The respondents were asked specifically about people at a client of <company>, people at <company’s> suppliers or service providers, other people outside of <company> (family, friends, people you know at other companies), and people you know through the Internet (e.g., electronic communities, listservs). The scale was (1 = Extremely Unhelpful, 7 = Extremely Helpful, 0 = Not a source of help).

**Dependent Variable: Job Performance**

Our dependent variable is post-implementation employee job performance. We use pre-implementation job performance as a control variable. There are many measures of employee job
performance each with their own benefits and shortcomings—but the most common approaches to job performance measurement are supervisor and self ratings (e.g., Bommer et al. 2005; Cleveland and Shore 1992; see also Siders et al. 2001). We used archival data from the organization that assessed overall job performance on a 7-point scale from very poor to excellent. We used supervisor ratings of employees obtained annually at the employees’ performance review. In conjunction with this study, employees also filled out a self-reported rating of job performance before and after the implementation around the same time as the annual evaluations. These self-ratings were gathered with the help of a market research firm. The involvement of an external agency was necessary to ensure confidentiality and avoid potential inflationary and social desirability biases in employees’ ratings.

**Manipulation Check: Perceived Transformation**

Our context was an IS implementation that caused changes to business processes, work flow, information flow, and interdependencies (see Davenport 2000). While the context description suggests that a new digital network was created by the IS implementation, we felt that assessing employees’ perceptions of job and workplace transformation via questions (on a 7-point scale) that spoke to the various types of changes listed above would further justify that the new IS system created a new digital network. A sample question from the four-item scale was: “The system has altered my job substantially.”

**Data Collection Procedure**

Our data were collected via online surveys. The data collection began with the measurement of pre-implementation job performance approximately five months prior to the implementation of the system and concurrent with the annual performance review of the employees. The evaluation of all employees in the organization were done alphabetically and
spread over a month. The system was rolled out in the business unit with a formal training program of three days. Immediately after the training, the employees filled out a survey that included basic demographic data and contact information. Although data regarding the training and initial sociometric data were collected at that time, they are not used in this paper as we collected sociometric data approximately six months after the implementation. We felt the data collected post-implementation more accurately reflected the get- and give-help networks as it is expected that the social networks would have been reshaped following the technology implementation as employees seek and give help to overcome challenges and take advantage of asserting their power in the organization (Burkhardt and Brass 1992). Sociometric data were collected from each respondent, as described earlier. Our data regarding the social networks post-implementation were also collected over a one month period as it was done concurrent with the timing of the next organizational performance evaluation process. Supervisors’ ratings of participants were thus obtained from organizational archives. Employees filled out self-assessments of performance directly on the market research firm’s site.

RESULTS

Table 1 (on p. 23) shows the descriptive statistics and correlations. The descriptive statistics suggest that employees engage with several peers in reasonable amount of giving and receiving help. The brokering ties and boundary spanning means and standard deviations are well within what would be expected given that the range of these constructs is 0 to 1. The boundary spanning means and standard deviations are low but that is perhaps to be expected given that employees interact more with co-workers within the work unit rather than outside. Interestingly, relative to pre-implementation ratings, both supervisor- and self-rated performance ratings were lower post-implementation. Perhaps not surprisingly, the self-rated job performance
was rated slightly higher than supervisor ratings and the standard deviations were lower for self-rated job performance. The correlations between supervisor- and self-rated job performance were lower after the implementation. Based on the measurement about six months post-implementation, the mean of perceived transformation was fairly high at 5.81 with a low standard deviation of .43, thus confirming that employees perceived that there were substantial changes and given the type of changes were in the throes of a new digital network.
Table 1. Descriptive Statistics and Correlations

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<th></th>
<th>Mean</th>
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<th>5</th>
<th>6</th>
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<th>10</th>
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<tbody>
<tr>
<td>1 Get-help (system)</td>
<td>5.39</td>
<td>2.88</td>
<td></td>
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<tr>
<td>2 Get-help (general)</td>
<td>6.94</td>
<td>2.77</td>
<td>.38***</td>
<td></td>
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<td>3 Give-help (system)</td>
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<td>2.95</td>
<td>.33***</td>
<td>.22**</td>
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<tr>
<td>4 Give-help (general)</td>
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<td>3.01</td>
<td>.30***</td>
<td>.25***</td>
<td>.29***</td>
<td></td>
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<tr>
<td>5 Brokering ties (system)</td>
<td>0.13</td>
<td>0.08</td>
<td>.16*</td>
<td>.11</td>
<td>.30***</td>
<td>.31***</td>
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<td>6 Brokering ties (general)</td>
<td>0.11</td>
<td>0.07</td>
<td>.15*</td>
<td>.14*</td>
<td>.34***</td>
<td>.37***</td>
<td>.32***</td>
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<td>7 External help (IT function)</td>
<td>2.24</td>
<td>1.08</td>
<td>.33***</td>
<td>.07</td>
<td>.22***</td>
<td>.17*</td>
<td>.38***</td>
<td>.34***</td>
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<td>8 External help (extra-org)</td>
<td>1.73</td>
<td>0.87</td>
<td>-.14*</td>
<td>-.15*</td>
<td>.25***</td>
<td>.32***</td>
<td>.41***</td>
<td>.43***</td>
<td>.22***</td>
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<td></td>
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<tr>
<td>9 Work unit bound. Spanning</td>
<td>0.13</td>
<td>0.10</td>
<td>.21**</td>
<td>.17**</td>
<td>.18**</td>
<td>.25***</td>
<td>.29***</td>
<td>.28***</td>
<td>.24***</td>
<td>.33***</td>
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<tr>
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<td>0.88</td>
<td>.30***</td>
<td>.07</td>
<td>.16*</td>
<td>.08</td>
<td>.13*</td>
<td>.14*</td>
<td>.21**</td>
<td>- .22***</td>
<td>.13*</td>
<td></td>
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<tr>
<td>11 Job performance (self)—pre</td>
<td>5.45</td>
<td>0.74</td>
<td>.34***</td>
<td>.13*</td>
<td>.19**</td>
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<td>.17*</td>
<td>.59***</td>
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<td></td>
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<tr>
<td>12 Job performance (supervisor)—post</td>
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<td>1.05</td>
<td>.39***</td>
<td>.02</td>
<td>.28***</td>
<td>.28***</td>
<td>.28***</td>
<td>.22***</td>
<td>.25***</td>
<td>- .29***</td>
<td>.14*</td>
<td>.28***</td>
<td>.23***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Job performance (self)—post</td>
<td>5.13</td>
<td>0.95</td>
<td>.38***</td>
<td>.15*</td>
<td>.33***</td>
<td>.32***</td>
<td>.31***</td>
<td>.25***</td>
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<td>.15*</td>
<td>.25***</td>
<td>.31***</td>
<td>.51***</td>
<td></td>
</tr>
</tbody>
</table>

Note: *p<.05; **p<.01; ***p<.001.
We tested for the presence of influential outliers using both the Cook’s Distance measure (Belsley et al. 1980) and graphical methods and found no significant outliers. We centered the data per the suggestions of Aiken and West (1991) in order to test for interaction terms; we also adhered to recommendations in other work with regard to testing interaction effects (see Carte and Russell 2003). Table 2 (on the next page) reports the results of the two sets of hierarchical regressions used to test our model. The first hierarchical regression used supervisor-rated performance as the dependent variable and the second hierarchical regression using self-rated performance as the dependent variable. In step 1, the control variable of pre-implementation job performance showed a slight positive effect on post-implementation job performance. In step 2, we entered all the direct effect terms, most of which were significant. Get-help (system), give-help (system and general), and brokering ties (system and general), thus supporting H1a, H2a, H2b, H3a, and H3b. Getting general help had no significant effect on supervisor-rated job performance but it did influence self-rated job performance, thus partially supporting H1b. Help from the IT function influenced supervisor- and self-rated performance, thus supporting H4a. One of the most interesting and contrary findings was observed in the context of extra-organizational help that negatively influenced supervisor-rated performance and had no effect on self-rated performance, thus being contrary to H4b. In step 3, all four moderating effects (get- and give-help with work unit boundary spanning) were found to be significant. Three of the four interaction terms had positive coefficients, as predicted by H1c and H2c. However, get-help (system) X work unit boundary spanning was a negative moderating influence, thus running contrary to H1c. We show this negative moderating effect as it relates to supervisor-rated job performance in Figure 2 (on the next page), a similar pattern was observed in the case of self-rated performance.
Table 2. Predicting Job Performance

<table>
<thead>
<tr>
<th></th>
<th>DV: Supervisor-rated performance</th>
<th>DV: Self-rated performance</th>
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<tr>
<td></td>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td>R²</td>
<td>.08</td>
<td>.33</td>
</tr>
<tr>
<td>ΔR²</td>
<td>-</td>
<td>.25</td>
</tr>
<tr>
<td>Model F</td>
<td>4.43***</td>
<td>8.84***</td>
</tr>
<tr>
<td>Job performance (pre-impl.)</td>
<td>.28***</td>
<td>.21**</td>
</tr>
<tr>
<td>Get-help (system)</td>
<td></td>
<td>.17**</td>
</tr>
<tr>
<td>Get-help (general)</td>
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<td>.02</td>
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<td>Give-help (system)</td>
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<td>Give-help (general)</td>
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<tr>
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<td>-.13*</td>
</tr>
<tr>
<td>Work unit bound. spanning (WUBS)</td>
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<td>.01</td>
</tr>
<tr>
<td>Get-help (sys) X WUBS</td>
<td>-.22***</td>
<td>-.24***</td>
</tr>
<tr>
<td>Get-help (general) X WUBS</td>
<td>.21**</td>
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<td>Give-help (sys) X WUBS</td>
<td>.17**</td>
<td>.15*</td>
</tr>
<tr>
<td>Give-help (general) X WUBS</td>
<td>.24***</td>
<td>.21**</td>
</tr>
</tbody>
</table>

Notes: *p<.05; **p<.01; ***p<.001. Standardized path coefficients are shown.

Figure 2. Moderation of the Get-help (System) to the Job Performance Relationship by Work Unit Boundary Spanning
DISCUSSION

Our findings showed that an employee’s social network affects his or her job performance following an IS implementation that created substantial changes to business processes, jobs, and workflow. Giving help, getting help, brokering ties, and external help influenced job performance. Interestingly, getting extra-organizational help negatively influenced supervisor-rated performance. Work unit boundary spanning moderated the effects of get- and give-help, both system-related and general, to influence job performance, with a negative moderation observed in the case of system-related get-help.

There are some notable strengths of the study reported here. First, the data were collected in situ in a representative business unit engaged in an IS implementation that resulted in substantial changes to business processes and workflow. Second, the sample of 87 is fairly large for a social network study (see Barsness et al. 2005). Third, the social network and performance data were collected from different sources, with performance data collected from supervisors also, allowing causal linkages to be made with little or no measurement biases. Fourth, using aggregated peer responses rather than self-reports to obtain the tie characteristics for a focal employee further enabled biases to be minimized. Finally, pre-implementation job performance was statistically controlled, thus isolating performance differences due to the help networks.

There are some limitations that should be noted. First, we did not control for employees’ pre-existing competence with IT and their ability to effectively use the new system. Second, we did not take into account subtle differences in job roles or relationships with superiors that could affect job performance, especially aspects not accounted for in pre-implementation performance. Third, we did not account for the substantive nature of the help given or received. Finally, the study was conducted in one business unit and may be subject to idiosyncrasies of the context.
Before discussing contributions and implications, we explain the contrary findings. The impact of an employee’s structural position is captured by brokering of ties in the system and generic help networks. We found that system-related brokering influenced job performance but general brokering did not influence job performance. This suggests that the prestige, prominence, and power that come from being centrally placed in the help network is more instrumental to job performance when the help is tied to some current organizational activity that is attracting attention—here, IS implementation. Challenges related to the technology may come to the forefront in the post-implementation phase, possibly displacing other non-technical issues.

While the effects of three types of help ties on job performance was positively moderated by work unit boundary spanning, the effect of system-related get-help ties was *negatively* moderated. This suggests that help from peers within the same work unit is “better” than help from employees outside the unit. This may even be true in that within-unit help may be more contextualized to the functions and the technical configuration at the unit, thus providing a compatible frame of reference (e.g., Carlile 2004). In addition, in-group peers may be able to deliver help in a manner that can be better absorbed. Past research suggests that people learn new ideas by associating those ideas with what they already know and it is easier for knowledge to transfer when the source and the recipient have common knowledge, similar training, and similar background characteristics (see Reagans and McEvily 2003). Another explanation for this finding may be that an employee seeking system-related help outside the work unit is seen as creating an external dependency for his or her unit that weakens its reputation externally, which results in a lower performance rating. Interestingly, this pattern was observed even in the case of self-rated performance, perhaps because the employee felt having to rely on help external to the work unit eroded his or her performance due to the added time spent on interactions.
Another unexpected finding relates to the role of extra-organizational help. While help from the IT function positively influenced job performance, help from outside the organization negatively influenced job performance. The explanation could be similar to what was discussed earlier—i.e., Going outside the organization for help may be regarded as making the focal organization dependent on external sources of competence, leaving it reputationally affected and susceptible to opportunistic behavior. The supervisor may also perceive that such external knowledge is not necessarily relevant to the employee’s work context. However, no effect was observed in the case of self-rated performance, possibly due to employees’ limited concern for the adverse impact on organizational reputation and that such knowledge does not necessarily materially affect his or her job positively or negatively.

**Theoretical Contributions**

This paper contributes to IS research by explaining employees’ job performance following an IS implementation. Our work sheds light on how help networks can influence job performance such that there is a more favorable effect among those who are fully engaged in help networks, even after controlling for pre-implementation job performance. The positive impact on employees’ job performance is a critical ingredient to achieving favorable organizational outcomes including positive return on IT investment in a shorter timeframe.

This work thus makes four key contributions to the literature. First, while past research has largely studied peer support in ongoing work contexts (e.g., Cummings and Cross 2004), we study the impact of the social network on employee job performance in the context of an IS implementation that creates a new digital network with new business processes and information flows, thus offering insights relevant to other organizations’ IT-driven change. At the same time, by restricting the study to the natural boundaries of a relatively homogenous business unit, the
peer support network can be completely elicited. Further, the business unit was organized as product line groups, thus defining the work unit boundaries and providing the context for an understanding of boundary spanning related to social networks. Hence, our social network data-gathering approach combines the benefits of both the bounded network and ego-centric elicitation. Second, in line with recent work making the distinction between task-focused and general altruistic interpersonal citizenship behaviors (Bowler and Brass 2006), we study the differential impact of system-related help and general help obtained or imparted through the social network. A related contribution was in showing the difference in the efficacy of help ties within a work unit and those spanning work unit boundaries. Past work has alluded to the notion of network range (Burt 1992) to capture ties that cross institutional, organizational, or social boundaries. Our study has validated the importance of network range. Third, as noted at the outset, prior research on disruptive innovations has focused primarily on the conditions and consequences (e.g., Lyytinen and Rose 2003). We extend the applicability of that work by focusing on how social networks and support are critical in times of change initiated by disruptive ITs. Finally, this study not only considers the giving and getting help, but also considers the impact of the structural position of employees in channeling this help, thus furthering our knowledge of the role of social networks on employee job performance.

This study points to the promise of social network analysis in understanding the underlying dynamics of IS phenomena and consequent job performance. Further, there are different direct and interacting effects on job performance. In IS implementations, technical help is an important requirement and getting or giving such help is important from an organization’s and employees’ perspectives. A fundamental contribution of this study over past research that has connected work ties to individual performance (e.g., Cross and Cummings 2004) is that it
shows that giving help is also significantly associated with performance, not just getting help from others. Our results, suggesting differences among types of help, point to possible differences in the type of help that is necessary during times of organizational change activities, particularly those driven by IT. While more work is needed to establish why the impact of system-related help ties differs from the impact of general help ties, the difference may be due to the efficacy of transfer of different types of knowledge. The efficacy of knowledge transfer is affected by the degree of tacitness or codifiability (Szulanski 1996) and it is likely that technical knowledge may be more or less sticky compared to help required in other areas.

**Theoretical Implications and Directions for Future Research**

Our context was an IT implementation that created a new digital network in a business unit. The strength of the context is it presents an often occurring type of organizational change activity. Future research could build on this to examine whether these findings will generalize to other types of organizational change events. Clearly, that will call for modification of the system-related get- and give-help constructs and, of course, the focus on external help from the IT department. Social networks research has pointed to several constructs that measure various network characteristics beyond those examined here (cf. Scott 2000). Structural aggregates, such as cliques, which refer to regions in the network that are relatively densely connected or cohesive, could be examined and tied to employee performance. However, rich theory development linking such constructs to important outcomes and examining their role in the context of important phenomena is lacking. While our work presents a step in this direction, much like the work of Cross and Cummings (2004), there is much more that could be done to examine various other network constructs and its influence on important outcomes, including job performance. While we adopted a social network theoretic lens for our investigation, other work
has related personality to job performance (e.g., Hurtz and Donovan 2000) and still other work has linked job characteristics to job performance. Future research can certainly compare these different theoretical perspectives to the social network perspective advanced here in terms of their predictive validity. Through a series of studies identifying the critical constructs in each of the theoretical perspectives, a more holistic and integrated model can also be developed. Future research can also extend the current work to the team level by considering how social network theories can help better understand team functioning and team work (see Kraut 2003).

From an IS research perspective, our work answers the call to examine broader individual impacts (see Delone and McLean 1992, 2003; Seddon 1997). In addition to job performance being an important individual-level outcome, it is an important outcome of interest to top management as it is closely associated with job satisfaction, organizational commitment, and turnover. This study also responds to the call by Agarwal and Lucas (2005) to examine the transformational aspects of technology and to view technology in terms of the complete organizational ensemble rather than just the artifact. As we noted earlier, our lens focused on network constructs, including IT-related constructs. Future research can develop a multi-level model that considers individual-level constructs, both from IS research and organizational behavior, that influence technology use (see Agarwal 2000) and employee job performance.

Although the use of multiple sources of job performance is a strength, future research should empirically test the model using actual measures of performance. Future research can build on this study to develop more sophisticated models of job performance and to investigate which facets of performance, such as efficiency or innovation, are more affected in these settings. Although our research focused on two different measures of job performance only to enhance validity, the discrepancies in predicting the two different measures of job performance
are worthy of further study. While supervisors were negatively influenced by employees’ extra-organizational help seeking, employees themselves did not think it played much of a role. This discrepancy could reflect either supervisors’ negative view of external ties, or reflect employees’ erroneous judgment when a negative impact actually occurs, or both views could be wrong which could only be ascertained with an objective performance measure. In any case, while supervisor- vs. self-rated performance is studied in organizational behavior research (e.g., Bommer et al. 1995), such investigations in the context of organizational change are limited and such future research can examine interventions that help better support employees, be sensitive to their needs, and ensure that expectations following such implementations are reasonable.

Social network studies are always difficult to conduct. We, therefore, limited our social network data collection to a focal business unit. While we did gather data about ties to IT and extra-organizational ties, we did not examine ties to employees in other units in the organization. Understanding such ties and the role they play would surely help us deepen our understanding of boundary spanning. While such future research would be important, it will be quite difficult to conduct due to practical constraints. To address such constraints, researchers could examine such ties and strength of ties by examining email archives. The findings from this work should be related to individual-level constructs such as leader-member exchange (for a review, see Liden et al. 1997) and perceived organizational support (for a review, see Rhoades and Eisenberger 2002). Other sources of support for problems and difficulties, especially for IT-related problems, are bulletin boards and email groups. The availability of such support was not studied in this work in part due to organizational restrictions on other data we could collect due to the social network questionnaire already being very long and time-consuming.
Exploring the longitudinal trajectories of social network reshaping and linking it to system use and employee performance would be valuable. Another interesting way to extend this study would be to investigate if the help network is also reflected in mindful usage of the system—i.e., do employees consider how their peers may benefit from insights that they gather from the system and do they share these with others? This line of research may also help generate insights to inform the design of IS to take advantage of the existing help ties and to further embed support for the interaction in the technology. Examples of such design features could include support for directing helpful content, data, or insight summaries to selected peers while a user is working with a system. Also, we did not investigate the use of specific media for obtaining and providing help. Past research suggests that employees’ use of media (such as electronic mail) is linked to their level of being informed about their company and commitment to its management’s goals (Kraut and Attewell 1997). Future research should examine how the use of different media underlying help networks may impact employee performance.

**Practical Implications**

Our findings point to proactive managerial interventions that can help support new IS implementations in organizations. Organizations must recognize the informal network of help ties connecting employees, and facilitate access to technical and general help. An important finding is that giving help positively influences job performance. Therefore, organizations should provide support for employees to become purveyors of informal help, supplementing more formal channels. This may be helped by nurturing cooperative norms, such that helpers have confidence that someone will be willing to assist them when they find themselves in a similar position, even if it is not in their short-term interests to do so (Uzzi 1997).
Our findings suggest that help-seeking activity across work unit and organizational boundaries may retard supervisor views of employees’ performance. Organizations need to think about the challenges in terms of syntactic, semantic and pragmatic gaps (Carlile 2004) that retard knowledge sharing across these boundaries, and facilitate creation of boundary objects (such as tools or interaction spaces permitting elaboration of understanding of other groups) or designate boundary roles to surmount these gaps. This suggests the need for organizations to proactively encourage intra-unit help ties and reward, rather than punish, such help-getting. Organizational policies and interventions encouraging such cross-unit support will again help employees overcome barriers to learning without always having to rely on work unit and/or IT department support. Employees in the organization need to be trained to consider multiple perspectives and different ways of framing what they know. If the premise that extra-organizational help can benefit the organization in the long-run is indeed true, supervisors should be cautioned not to penalize employees for extra-organizational ties in the formal performance evaluation process.

The diagnostic information from employees’ social networks can readily help identify potential isolates who need more formal support to remedy their limited informal help ties. Similarly, organizations should consider leveraging those in brokering positions to dedicate part of their time to supporting others as they might be able to provide access to a diverse knowledge base. Organizations can even leverage informal networks to create more formal support networks based on the informal networks; such an approach could be an alternative to using employees who are perceived as experts by management. Employees identified using social network maps may zero in on those who are not only knowledgeable but also those who are also perceived as a friendly and easy to talk to/work with. Given that IT support desks are constantly overworked and lack the business domain expertise, they often are not able to provide adequate help users
overcome difficulties (Govindarajulu 2002), informal social networks and formal support leveraging informal networks may hold the key to helping users in a timely manner, ensuring that users can achieve high levels of performance in short order, and minimizing the loss of productivity following the implementation of any technology that creates a digital network.

CONCLUSIONS

Our study showed that an employee’s social network characteristics related to giving and getting help explained self- and supervisor-rated job performance following a new IS implementation. Help ties that span across work unit boundaries are more effective, except for technical help. Brokering of technical help ties also positively influenced performance. Further, getting extra-organizational help negatively influenced supervisor-rated performance. These findings confirm that a complex new IS system present both challenges for employees that may be overcome with peer support and opportunities to leverage technical and other work-related competence to help others and in the process, enhance employees’ performance.

REFERENCES


